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Fantz et al.

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## [54] BOUQUET WRAP MACHINE

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## [57] ABSTRACT

[21] Appl. No.: **291,378**

A method and apparatus for automatically wrapping a sheet of material about a bouquet of flowers. A sheet of material having spaced apart defined first and second portions is placed against a support member, such as a prepared table top, and the bouquet is positioned on the sheet with the first and second portions of the sheet extending on right and left sides, respectively, of the bouquet. The first sheet portion is then moved in a path to at least partially encompass the bouquet, and the second sheet portion is moved in a path to at least partially encompass the bouquet and to extend over part of the first sheet portion. The two sheet portions may be secured together by a bonding material, or the first and second portions of the sheet of wrapping material can themselves act as a bonding material by application of appropriate heat sealing, sonic welding, vibratory welding, and similar methods. A stiff wrap ring form may be positioned suspended over the sheet of material, and the bouquet inserted in the wrap ring form. The stem portion of the bouquet may be tightly wrapped by a separate wrapping operation.

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## Related U.S. Application Data

[63] Continuation of Ser. No. 990,226, Dec. 14, 1992, abandoned.

[51] Int. Cl.<sup>6</sup> ..... **B65B 11/02; B65B 13/00**

[52] U.S. Cl. .... **53/399; 53/397; 53/465; 53/580; 53/590; 53/218; 53/210**

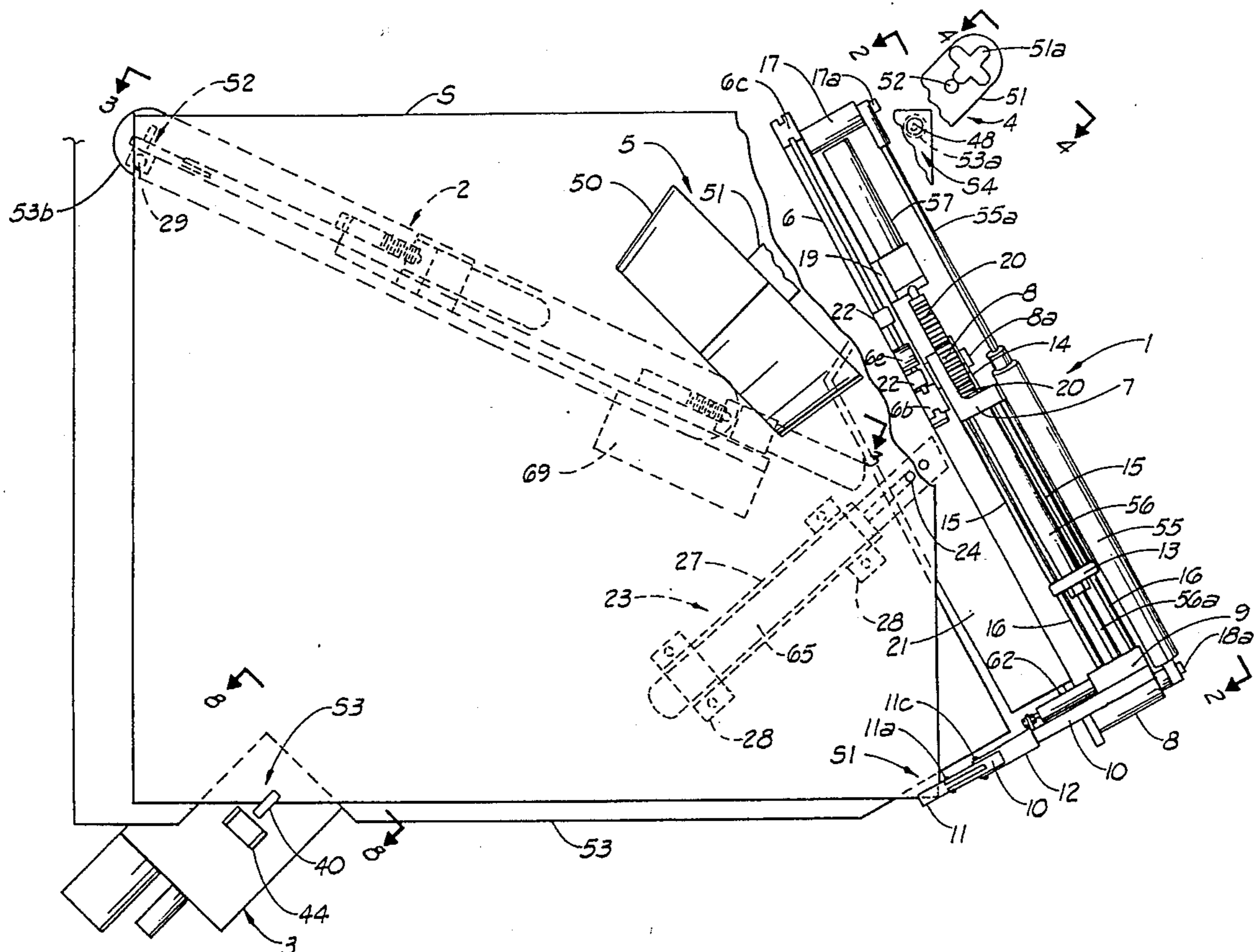
[58] Field of Search ..... 53/397, 399, 461, 53/465, 580, 582, 590, 592, 594, 218, 219, 390, 575, 201, 210, 49

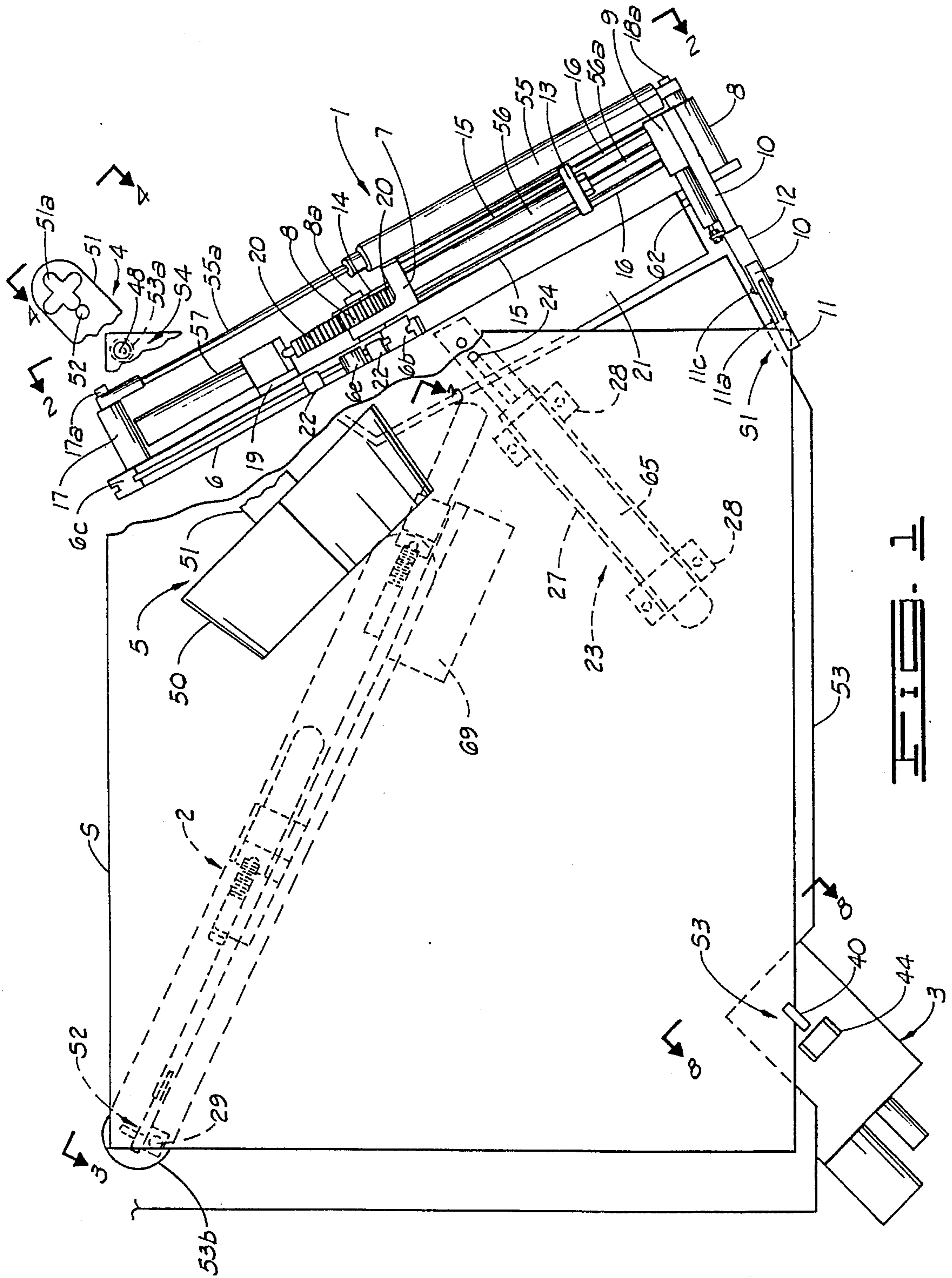
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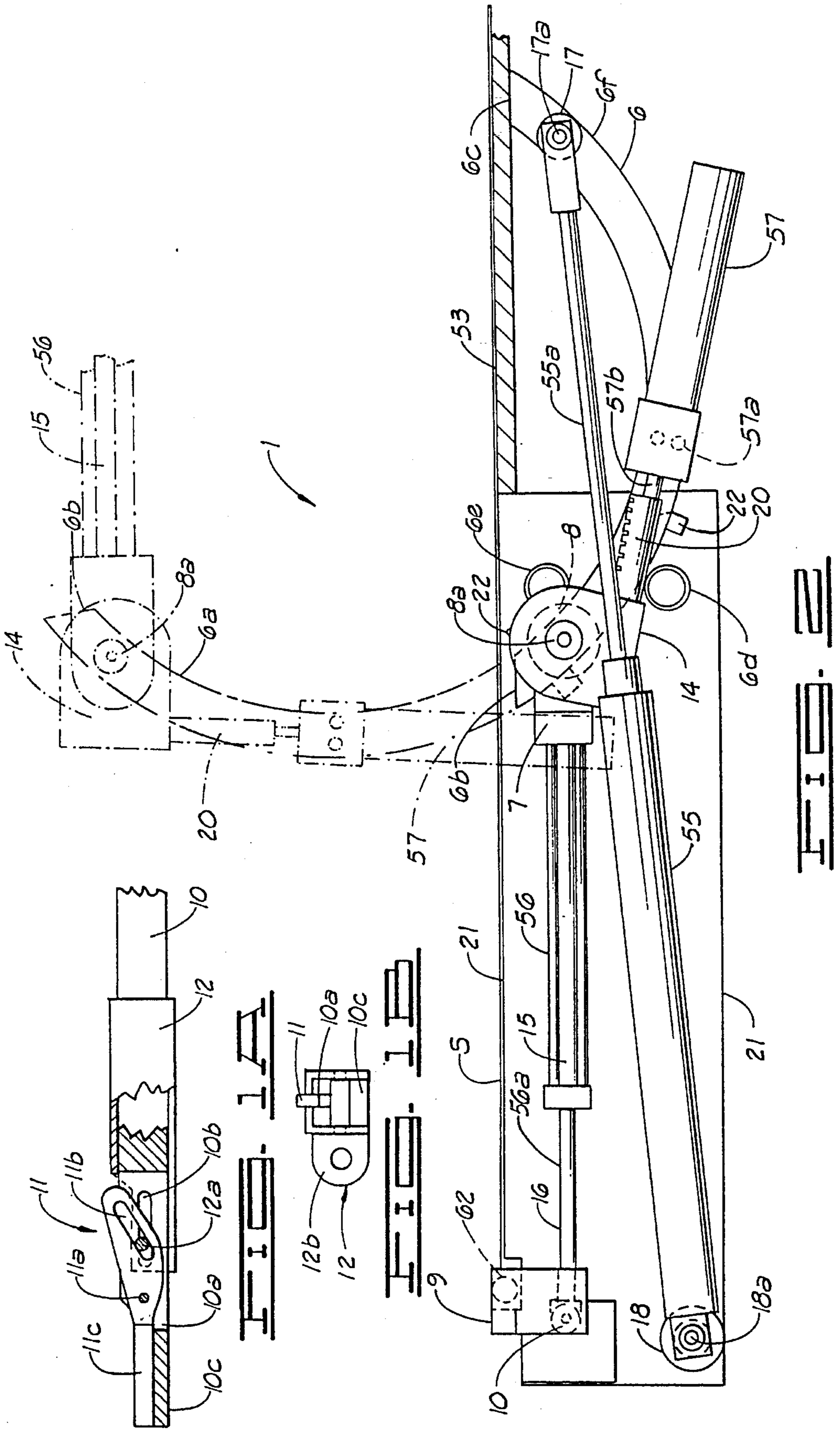
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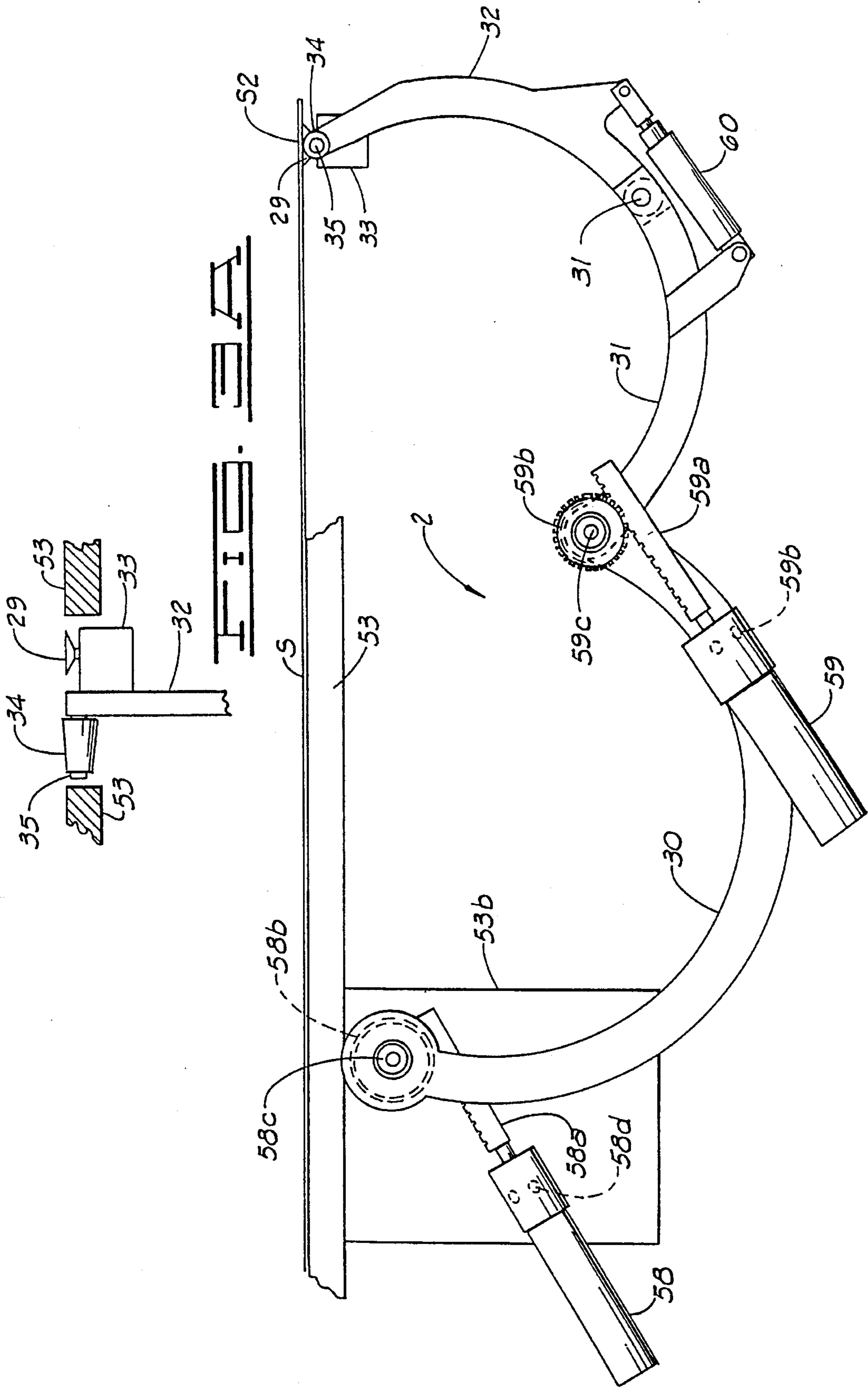
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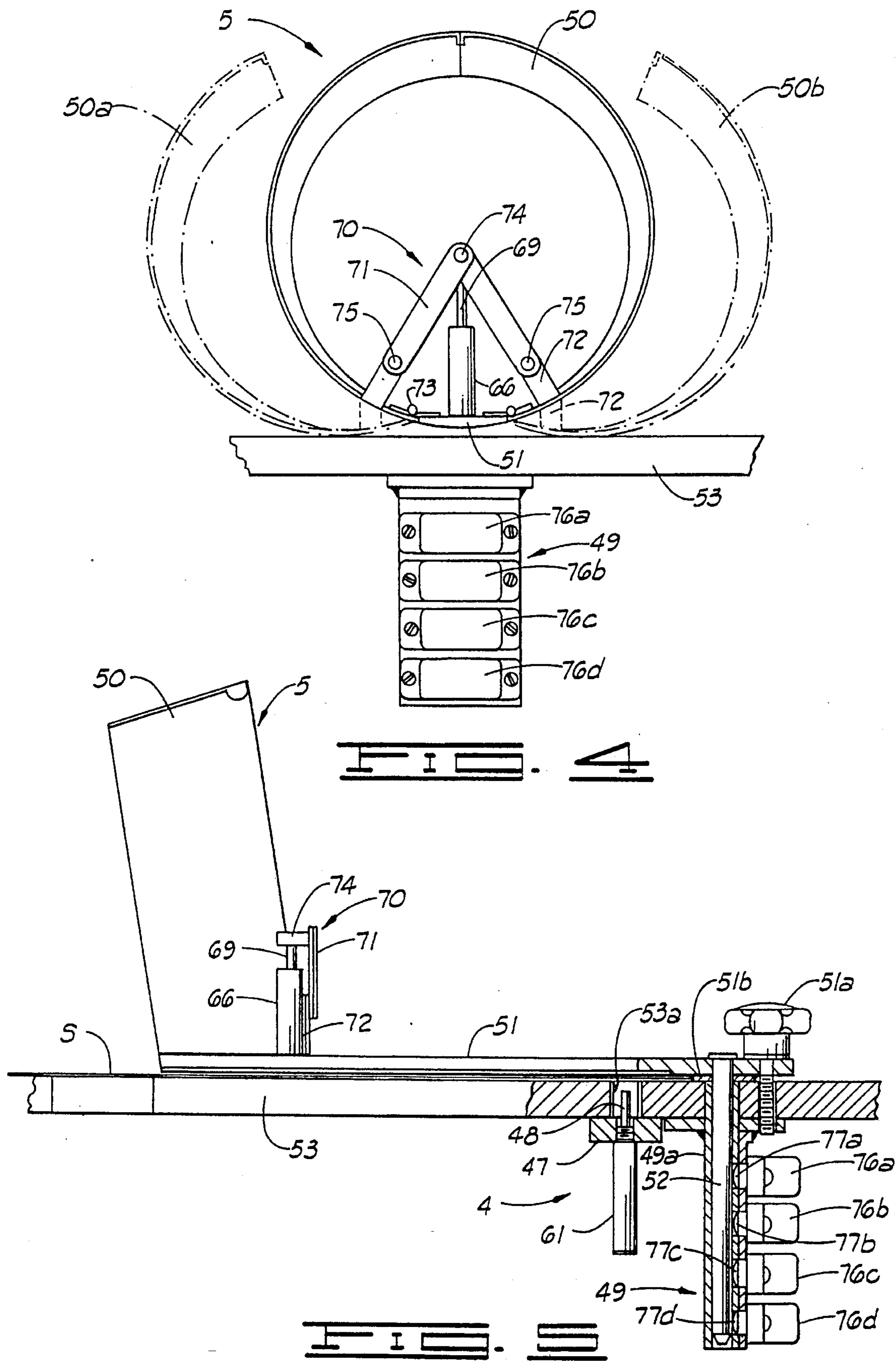
**16 Claims, 6 Drawing Sheets**

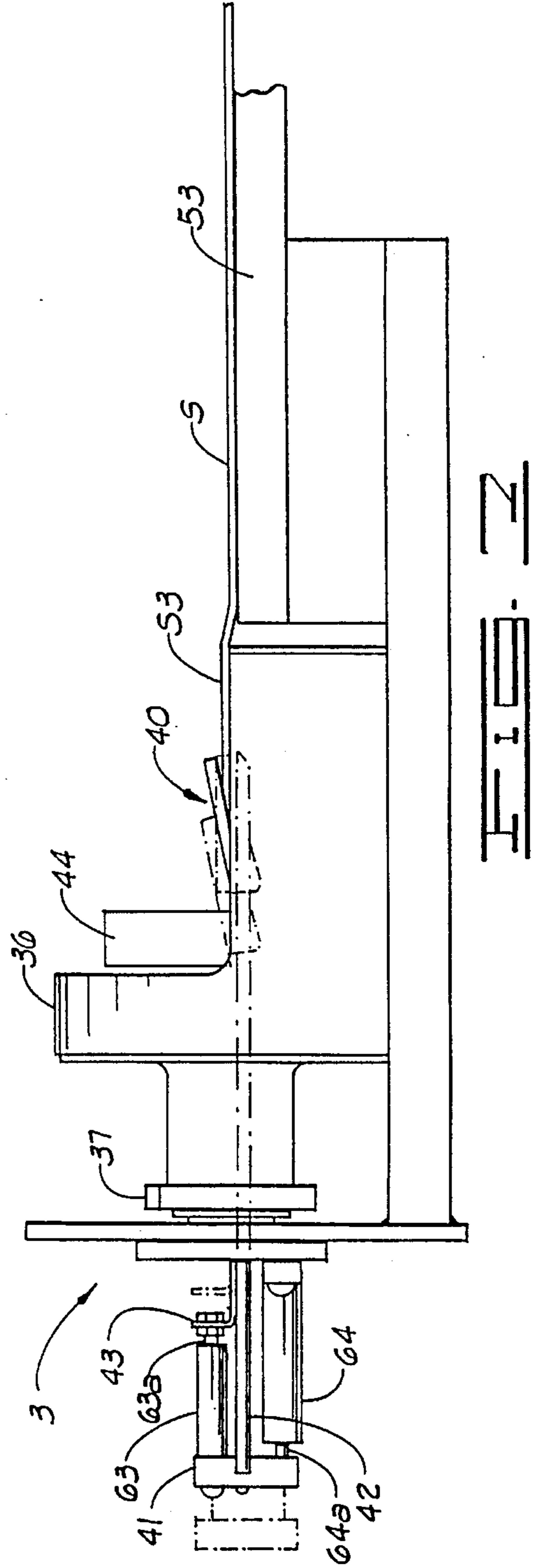
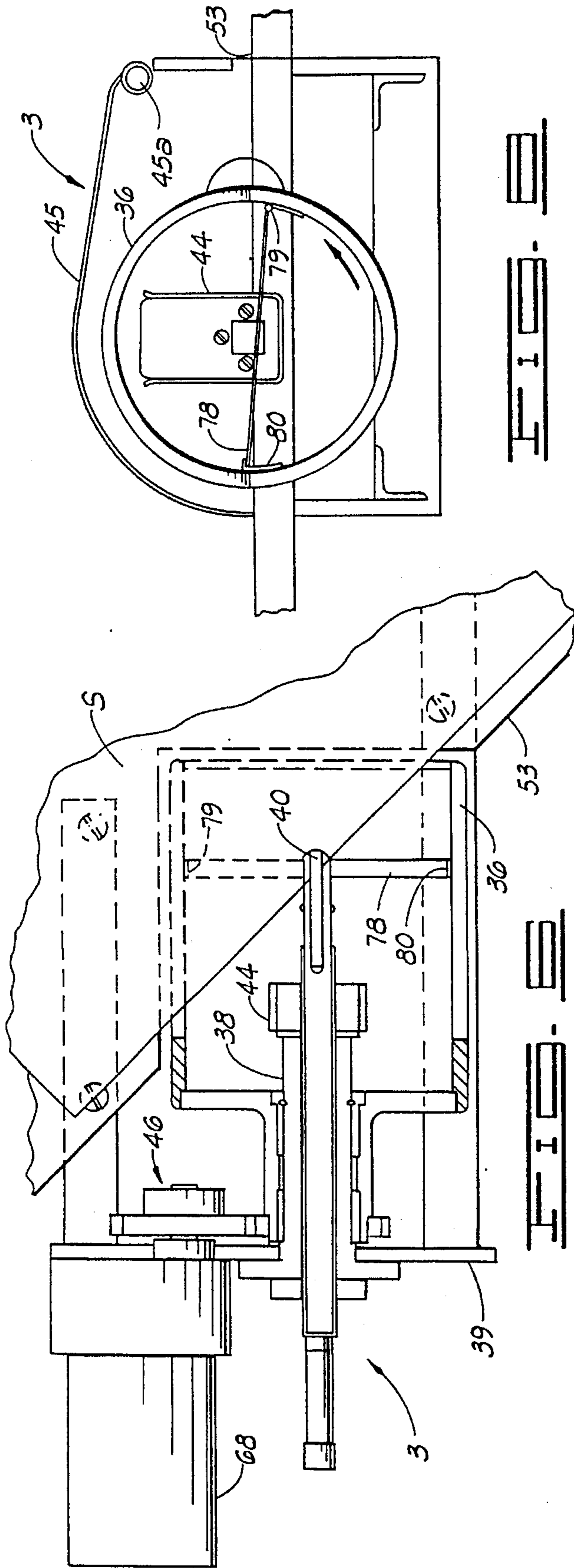


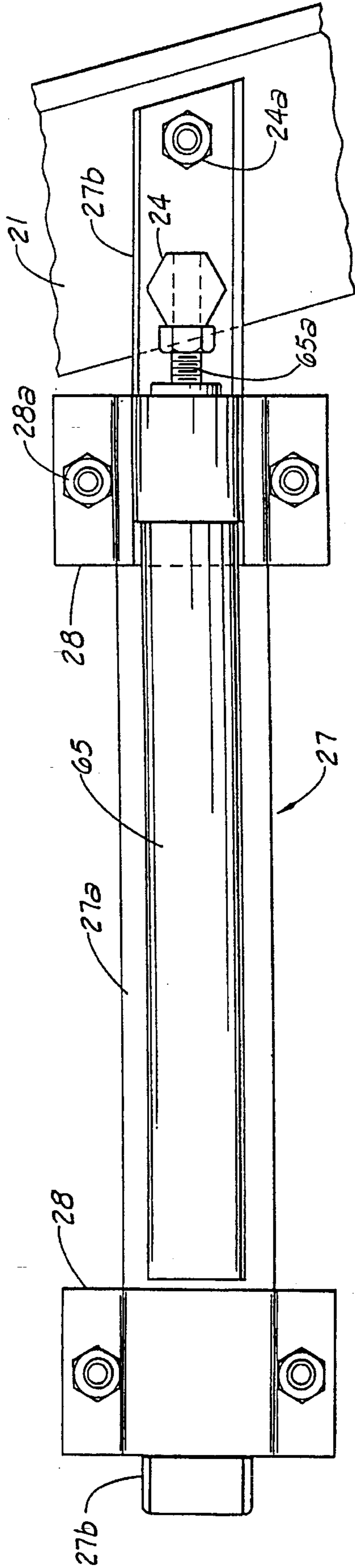
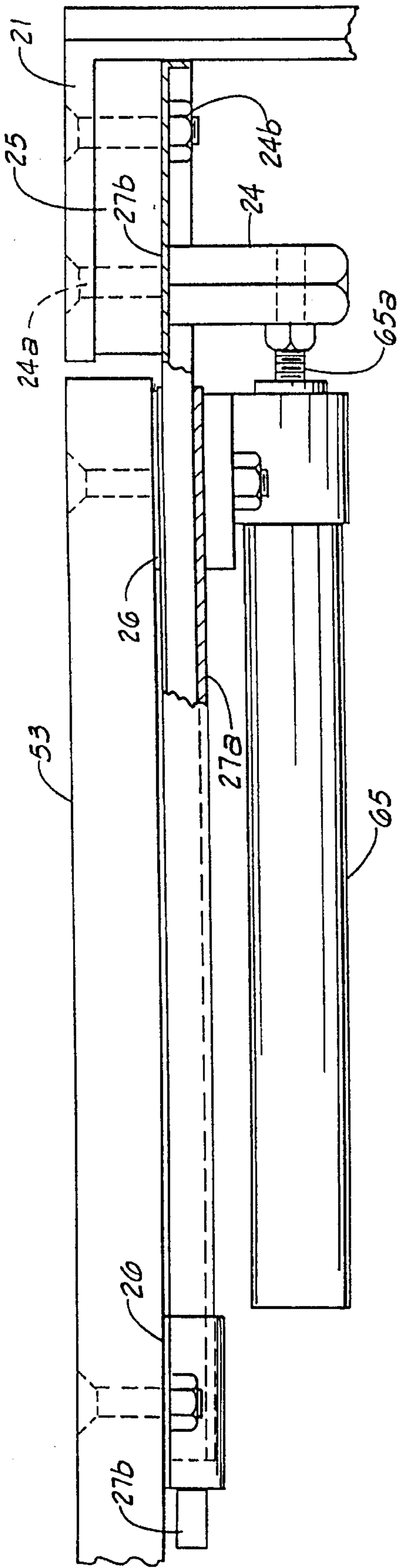












**BOUQUET WRAP MACHINE****CROSS-RELATED REFERENCE**

This application is a continuation of U.S. Ser. No. 07/990, 5  
226, filed Dec. 14, 1992, now abandoned.

**BACKGROUND OF THE INVENTION****1. Field of the Invention**

The present invention relates generally to wrapping floral 10  
groupings, and more particularly, but not by way of limitation, to a method and apparatus for wrapping a bouquet of botanical items automatically.

**2. Brief Description of the Prior Art**

Wrapping floral groupings, such as bouquets, is an old art. 15  
The wrapping protects the floral grouping, maintains the floral grouping in a relatively high moisture environment, makes the floral grouping more attractive, and protects the person giving or receiving the floral grouping by shielding 20  
the person or their clothing from excess moisture, color or pollen transfer, and damage from thorns and the like. However, in the past, the wrapping of floral groupings to form, for example, a bouquet has been done manually. A florist would select or cut a sheet of wrapping material, place the 25  
floral grouping with the stems toward one corner, bring the two corners adjacent the stem corner together in an overlapping fashion, and then secure, or not, as desired, the overlapping portions of the sheet of material together.

There are many disadvantages to manually preparing 30  
wrapped floral groupings. The manual process is very time consuming, thereby adding expense to the final product. The resulting wrapped floral grouping may vary considerably in aesthetic value, depending upon the skill and experience of the person doing the wrapping. Even experienced wrappers 35  
may not wrap the floral grouping with the proper shape and size, so that the floral grouping may not be secure within the wrapping. Additionally, while the main part of the floral grouping may be adequately wrapped and protected, the stem area of the wrapping does not wrap the stems tight 40  
enough and may allow the stems to protrude through the stem end of the wrapping which makes the floral presentation unsightly and, again, can injure a person or damage a person's clothing. Even after a successful or adequate manual wrap, problems arise in attempting to band the wrap 45  
or otherwise affix the wrap upon itself. Handling the unbanded or unfastened wrap is awkward and may require two people, one to hold the wrap in place and the other to band or fasten the overlapping corners of the wrap.

There is therefore a clear need in the art for a method and 50  
apparatus for automatically wrapping floral groupings which provide consistent wrapping of proper shape and size and which can, optionally, prepare a tight wrap of the stem portion of the floral grouping, and/or band or fasten the 55  
wrapping, resulting in an aesthetically pleasing floral presentation absent all of the disadvantages resulting from the aforementioned manual wrapping method. The present invention fulfills that need.

**SUMMARY OF THE INVENTION****Definitions**

The material which comprises the sheet of material S is 65  
preferably selected from the group of materials consisting of: man-made organic polymer films; fibers or fabric (woven or non-woven, synthetic or natural); metallic and non-metallic foils; paper (coated or uncoated, treated or

untreated); cellulose (including cellophane); leather; burlap; 5  
"dead fold" or semi-rigid sheet materials including, but not limited to, "dead-fold" plastic sheets, wire laminated flexible sheet material, waxed sheet material, starched or sugared sheet material; and laminates; or combinations thereof. The sheet of material S used with the bouquet wrapping apparatus may employ materials having adhesives or cohesives on both sides of the sheet S, an adhesive on one side and a cohesive on the other side or a cohesive or adhesive on only 10  
one side of the sheet S with no adhesive or cohesive on the other side of the sheet S. The sheet S may be a heat sealable material which can be sealed with heat devices. The sheet S may be a weldable film which can be welded with heat or welded sonically or with a vibratory welding means.

"Floral grouping" as used herein, means cut fresh flowers, 15  
artificial flowers, a single flower, other fresh and/or artificial plants or other floral materials, and may include other secondary plants and/or ornamentation which add to the aesthetics of the overall floral grouping. The floral grouping has a stem and a bloom end. 20

The term "botanical item", as used herein, means a natural or artificial herbaceous or woody plant, taken singly or in combination. The term "botanical item" also means any portion or portions of natural or artificial herbaceous or woody plants including stems, leaves, flowers, blossoms, buds, blooms, cones, or roots, taken singularly or in combination, or in groupings of such portions such as bouquets or floral groupings. 25

For convenience, the term "bouquet" will be used hereinafter to substitute for the term "floral grouping". Therefore, when the term "bouquet" is used, what is meant is "floral grouping" as defined above. 30

The term "bonding material" as used herein includes adhesives, preferably pressure sensitive adhesives, or cohesives. Where the bonding material is a cohesive, a compatible cohesive material must be placed on the adjacent surface for bondingly contacting and bondingly engaging with the first-mentioned cohesive material. The term "bonding material" also includes materials which are heat sealable and, in this instance, the adjacent portions of the material must be brought into contact and then heat must be applied, or generated, to effect the seal. The term "bonding material" as used herein also means a heat sealing lacquer which may be applied to the sheet of material and, in this instance, heat 35  
also must be applied, or generated, to effect the sealing. The term "bonding material" as used herein means any type of material or thing which can be used to effect the bonding or connecting of the two adjacent portions of the material or sheet of material to effect the connection or bonding described herein. The term "bonding material" also includes labels, bands, ribbons, strings, tape, staples or combinations thereof. 40  
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**Discussion**

The present invention overcomes the aforementioned 55  
disadvantages of manually wrapping bouquets, as is done in the prior art, by providing a method and apparatus for automatically wrapping a sheet of material about a bouquet. A sheet of material having spaced apart defined first and second portions is placed against a support member, such as 60  
a prepared table top, and the bouquet is positioned on the sheet with the first and second portions of the sheet extending on right and left sides, respectively, of the bouquet. The first sheet portion is then moved in a path to at least partially encompass the bouquet, and the second sheet portion is 65  
moved in a path to at least partially encompass the bouquet and to extend over part of the first sheet portion. Such automatic operation insures proper size and shape for the



wrapping material and also assures consistency from one bouquet to another.

In another aspect of the invention, the two sheet portions are secured together by a bonding material, or the first and second portions of the sheet of wrapping material can themselves act as a bonding material by application of appropriate heat sealing, sonic welding, vibratory welding, and similar methods. Alternatively, or additionally, the wrapped bouquet may be elastically or nonelastically banded.

In another aspect of the invention, the stem portion of the bouquet is tightly wrapped by a separate wrapping operation.

In yet a further aspect of the invention, a member defining a wrap ring form may be positioned suspended over the sheet of material, and the bouquet inserted in the wrap ring form. The wrapping process is then performed, and the wrap ring form provides a stiff bouquet encompassing structure about which the sheet of material can be wrapped for improved consistency of shape and size of the finished wrapped product. This is due to the ability of the stiff wrap ring form to accommodate the necessary tension forces applied to the sheet by the wrapping machine, especially at the end of the wrap cycle. Such forces might otherwise crush the bouquet.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described having reference to the accompanying drawings in which:

FIG. 1 is a plan view of the bouquet wrap machine according to the present invention;

FIG. 1A shows a partial cross sectional view of the pinch clamp for holding and manipulating one corner of the sheet of wrapping material;

FIG. 1B is a left elevation view of the pinch clamp shown in FIG. 1A;

FIG. 2 is a side elevation view taken along the lines 2—2 in FIG. 1 showing the components of the right hand wrap unit assembly;

FIG. 3 is a side elevation view taken along the lines 3—3 in FIG. 1 and showing the components of the left hand wrap unit assembly;

FIG. 3A is a partial right end view of the left hand wrap unit assembly of FIG. 3.

FIG. 4 is an end view of the wrap ring member, in both open and closed positions, taken along the lines 4—4 in FIG. 1, with some parts removed so as not to obscure the wrapping function;

FIG. 5 is a right elevation view of the wrap ring member shown in FIG. 1;

FIG. 6 is a plan view, in partial cross section, of the bouquet stem wrapping unit;

FIG. 7 is a side elevation view of the stem wrapping unit;

FIG. 8 is an end elevation view of the stem wrapping unit taken along the lines 8—8 in FIG. 1;

FIG. 9A is a side elevation view of the slide assembly shown in phantom in FIG. 1; and

FIG. 9B is a bottom plan view of the slide assembly shown in FIG. 9A.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 is a plan view of the bouquet wrapping apparatus showing a portion of a supporting surface or machine top 53

which is mounted on a machine frame (not shown), and various subassemblies of the apparatus that are mounted on the machine top 53.

A right hand wrap unit assembly 1 is generally positioned and operable from the right hand side of the bouquet to be wrapped. A sheet of wrapping material S of preselected size is positioned and clamped to machine top 53 adjacent each of the four corners of the sheet. In FIG. 1, a portion of the sheet S and a portion of the machine top 53 are removed so as to be able to view some of the components of the right hand wrap unit assembly 1 which, in its initial position, lies below the level of top surface of machine top 53.

A left hand wrap unit assembly 2 is shown in phantom lines in FIG. 1 to be positioned below the sheet S and, in its initial position, also at a level below the top surface of machine top 53, as is the initial position of the right hand unit 1. An elongated slat 53b is provided in machine top 53 to permit left hand wrap unit assembly 2 to move there-through and manipulate corner S2 of the sheet S.

A stem wrapper unit assembly 3 is positioned adjacent the stem end of a bouquet to be wrapped, and a fixed clamp assembly 4 functions to clamp the corner S4 in position as shown in the upper right hand corner of the sheet S in FIG. 1.

A wrap ring form assembly 5, available in different sizes depending upon the size of bouquet to be wrapped, is positioned adjacent the corner S4 of sheet S, the wrap ring 50 being shown in the closed position in FIG. 1.

A slide assembly 23, also shown in phantom in FIG. 1, is mounted beneath the machine top 53 and serves the function of moving the right hand unit 1 away from the wrapped bouquet at the end of the wrapping cycle.

The bouquet wrap apparatus of FIG. 1 is a self contained machine for use with a preselected size sheet S of plastic film, clear or colored, painted or unpainted, printed or unprinted. The sheets S may be pre-cut sheets, or automatically dispensed from a roll dispenser which feeds a sheet of desired size to the proper working position on the machine top 53.

The basic operation of the apparatus is as follows. The sheet S is held down at or adjacent each corner by a hold down mechanism for each corner, yet to be described in detail. It is sufficient at this point in the description to simply indicate that the four corners of sheet S are held or clamped by pinch clamp 11 on corner S1, vacuum cup 29 at corner S2, pinch clamp 40 at corner S3, and fixed clamp plunger 48 at corner S4. The wrap ring support member 50 of the wrap ring assembly 5 then opens, as best seen by the phantom lines in FIG. 4, to accept a bundled bouquet with the stems of the bouquet directed to the corner S3 of the sheet S, and with the stems confined within a U-shaped stem holder 44. The bloom end of the bouquet is positioned within the wrap ring support member 50.

With the sheet clamped at all four corners and the wrap ring support member 50 closed, the right hand wrap unit assembly 1 rises to pull corner S1 of the sheet of material up and around the bouquet to a position greater than 180° about the periphery of the bouquet, with the pinch clamp 11 coming to rest adjacent the periphery of the wrap ring support member 50 and toward the rear of the machine top 53. This completes the first part of the wrap cycle.

At, after, or before completion of the first part of the wrap cycle, the left hand wrap unit assembly 2 carries the corner S2 of the sheet of material up and about the bouquet to be wrapped and comes to rest with the suction cup 29 adjacent the periphery of wrap ring support member 50 toward the

front of machine top 53. This second part of the wrap cycle obviously causes the corner S2 to overlap the sheet of material by a substantial amount so that the portion of material between the outer surface of the sheet adjacent corner S1 and the inner surface of the sheet adjacent corner S2 is sufficient to provide a large overlapping contact area and, if desired, adequate adhesion or coadhesion between the two facing surfaces. The left hand wrap unit assembly 2 manipulates the corner S2 in a path so as to first overlap the sheet adjacent corner S1, but spaced therefrom, and then make contact between the overlapping sheet portions.

After completion of the second part of the wrap cycle by left hand wrap unit assembly 2, the stem wrap unit assembly 3 operates to tightly wrap the corner S3 of the sheet of material tightly about the stem portion of the bouquet.

After adhesion, coadhesion, heat sealing, sonic sealing, vibratory sealing, elastic banding, nonelastic banding, or the like to keep the wrapped bouquet secure, all sheet clamps are released, slide unit 23 operates to push the right hand wrap unit assembly 1 away from machine top 53, and both right and left hand wrap unit assemblies 1 and 2 retract to beneath machine top 53. The operator then removes the wrapped bouquet, stems first, by pulling the wrapped stem portion away from the wrap ring support member 50, thereby pulling the bloom end of the wrapped bouquet through the closed wrap ring support member 50 with the sheet of material S sliding by the outer periphery of the support member 50, completing the cycle.

The operation of the right hand wrap unit assembly 1 will now be described in detail with reference to FIGS. 1, 1A, 1B, and 2. A C-shaped rocker arm 6 having an H-shaped cross section is confined to move along the periphery of a circular path the center of which is the center of an imaginary circle having a segment of its periphery defining the C-shape of the rocker arm 6. In its initial position, rocker arm 6 is located beneath machine top 53 as shown by solid lines in FIG. 2. The ends 6b and 6c of rocker arm 6 are cut at an angle so as to not interfere with the sheet of material positioned on machine top 53. A pair of rollers 6d and 6e confine the movement of rocker arm 6 to the aforementioned circular path by rolling against the circular outer periphery 6f and the circular inner surface 6a, respectively. Aiding in confining the rocker arm 6 to its circular path are a number of rocker support clips 22 each having a tab (not shown) which slidably fits within one of the edge slots on either side of the rocker arm 6, the slots defined by the H-shaped cross section of rocker arm 6.

A right hand unit angle mount 21 supports the entire mechanism of right hand wrap unit assembly 1. Angle mount 21 mounts the operational parts of right hand wrap unit assembly 1 on its vertically oriented portion, and the horizontal portion of angle mount 21 is securely affixed to the end of slide 27, so that right hand wrap unit assembly 1 can be moved to the right (in FIG. 1) after completion of the wrap cycle.

Fixed to the angle mount 21 is a pivot pin 18a about which rocker cylinder pivot standoff 18 is positioned to locate rocker cylinder 55 spaced from other components of right hand wrap unit assembly 1 and permit rocker cylinder 55 to pivot about pin 18a. Rocker cylinder 55 is shown as a pneumatic or hydraulic piston cylinder which reciprocates a piston shaft 55a having its distal end pivoted about pivot pin 17a and spaced from rocker arm 6 by a rocker arm standoff 17. Pivot pin 17a is fixed to the far right hand end of rocker arm 6 as shown in FIG. 2. Operation of rocker cylinder 55 causes shaft 55a to either pull or push against

pivot pin 17a and effect the movement of rocker arm 6 along the aforementioned circular path. In the fully closed position of piston shaft 55a, rocker arm 6 will have the position shown by dashed lines in FIG. 2.

For ease in discussing the operation of the various active elements of the invention, the term "cylinder" as used hereinafter will refer to a pneumatic or hydraulic cylinder or any other mechanism which is capable of applying reciprocal motion to an object. Each of these types of elements are depicted in the drawings as pneumatic cylinders.

Before operation of cylinder 55 to raise the right hand wrap unit assembly 1, the corner S1 of sheet S is clamped by a pinch clamp 11, the details of which are best seen in FIGS. 1A and 1B. The side view of the pinch clamp 11 in FIG. 1A shows a right hand clamp arm 10 affixed to right hand cushion cylinder head 9 (see FIG. 1) which, in turn, is fixed to the end of piston shaft 56a and cushion cylinder slide rods 16. The end of pinch clamp 11 is flattened to form an upper jaw 11c. The free end of clamp arm 10 is narrowed and flattened to form a lower jaw 10c of the pinch clamp 11. A slot 10a near the end of clamp arm 10 permits the vertically oriented thinned portion of pinch clamp 11 to move within slot 10a (FIG. 1B). Pinch clamp 11 itself is pivoted about pin 11a fixed to clamp arm 10 and has a slot 11b angled with respect to a cooperating slot 10b in clamp arm 10. A pin 12a passes through slots 10b and 11b and is fixed to each side of a U-shaped clamp actuator 12. A tab 12b of actuator 12 is reciprocated by action of a clamp cylinder 62. As tab 12b is reciprocated, actuator 12 reciprocates and causes the jaws 10c and 11c to open and close depending upon whether the movement of actuator 12 is to the right or left in FIG. 1A. In the open position of clamp 11, a sheet S can be moved into its predetermined position for clamping, and at the beginning of the wrap cycle, cylinder 62 operates to close jaws 10c and 11c to clamp the corner S1 of the sheet of material therebetween.

With the material clamped by pinch clamp 11, cylinder 55 is operated to retract piston 55a into cylinder 55. This pulls pin 17a to the left in FIG. 2 and moves rocker arm 6 in a circular path as previously described.

Near the left end of rocker arm 6 a pivot pin 8a passes through a swing gear guard 14, a pinion gear 8, and a solid angle piece referred to hereinafter as a swing block 7, all of such components being fixed to rocker arm 6 by the pivot pin or screw 8a. A right hand swing cylinder 57 is fixed to the approximate center of rocker arm 6 by screws 57a and carries a rack 20 at the end of the piston shaft 57b. The rack 20 has a system of teeth which mesh with and cooperate with the teeth of pinion gear 8 affixed or keyed to swing block 7, such that movement of the piston shaft 57b effects rotation of pinion gear 8 by the reciprocal motion of rack 20 at the appropriate times in the wrap cycle. Thus, when cylinder 55 retracts piston shaft 55a, pivot pin or screw 8a begins to rise in the path illustrated in FIG. 2, resulting in a swinging movement of the elements connected to rocker arm 6, including cylinder 56 and, in turn, right hand clamp arm 10 with the corner S1 of the sheet material being clamped thereto.

At the beginning of the operation of right hand wrap unit assembly 1, cylinder 57 is not activated and has its piston 57b fully retracted. This permits right hand cushion cylinder 56 to lie relatively flat beneath the machine top 53 and extending to the left in FIG. 2. As cylinder 55 retracts piston 55a, swing block 7 which supports cushion cylinder 56 moves upwardly as rocker arm 6 follows its circular path.

At a prescribed position of the rocker arm 6, swing cylinder 57 begins to force piston 57b outwardly rotating

pinion gear 8, by the action of rack 20, in a clockwise direction as seen in FIG. 2. Since pinion gear 8 is fixed or keyed to swing block 7, right hand cushion cylinder 56 rotates clockwise as well, pivoting about pin or screw 8a. In this manner, the corner S1 of the sheet of material is first brought upwardly and then the sheet begins to wrap about the bouquet with the interior portion of the sheet forming around wrap ring support member 50.

This contact of the sheet of material with support member 50, in effect, limits the upward movement of the sheet of material so that the diameter of the swing of wrap unit assembly 1 must necessarily be reduced; otherwise, the corner S1 would slip out of pinch clamp 11, or it would tear. This is accomplished by the operation of cylinders 56 and 57, the former causing the radius of the swing movement to directly decrease as a result of the retraction of piston 56a into cushion cylinder 56 and telescopic retraction of cushion cylinder slide rods 16 within cushion cylinder fixed rods 15. Telescoping rods 15, 16 provide strength and stability to the operation of cushion cylinder 56. Operation of cylinder 57 brings the right hand clamp arm 10 down into position against the far side of wrap ring support member 50, i.e. to a position greater than 180° about the periphery of the bouquet, to complete the first part of the wrap cycle.

Toward the end of the first part of the wrap cycle, or after completion thereof, as desired, the left hand wrap unit assembly begins to function. (see FIG. 3).

At the start of the next part of the wrap cycle, the left hand wrap unit assembly 2 is entirely located beneath the machine top 53. Pneumatic cylinders 58, 59, and 60 are in their retracted positions, and suction cup 29 is located substantially level with the top of machine top 53.

The left hand wrap unit assembly 2 is comprised primarily of a pair of C-shaped swing arms, a main swing arm 30 and a secondary swing arm which has a stub portion 31 extending to a cushion arm 32 having the vacuum cup 29 attached to the free end thereof. Secondary swing arm stub portion 31 is pivotally attached to cushion arm 32 by a pivot member 31a, and relative pivotal movement between these two members is effected by the operation of cushion cylinder 60.

FIG. 3a shows the end of cushion arm 32 having a conical shaped roller 34 rotatable about a roller mount screw 35 on one side thereof, and a vacuum cup holder 33 with vacuum cup 29 positioned on the opposite side. A vacuum pump (not shown) is connected to vacuum cup 29 after the sheet of material S is in position on machine top 53 and the wrapping procedure is ready to begin. In operation, a vacuum is applied to vacuum cup 29 to hold the corner S2 of the sheet of material in place even before the actuation of the right hand wrap unit assembly 1.

At the appropriate time in the wrapping sequence, cylinder 58 is actuated to extend its cylinder and the rack 58a attached thereto. Cylinder 58, by screws 58d, is mounted to left hand swing arm mounting bracket 53b which is attached to the bottom of machine top 53. As rack 58a moves outwardly from cylinder 58, a pinion gear 58b fixed or keyed to the left end of main swing arm 30 begins to rotate about its shaft 58c. This causes the entire left hand wrap unit assembly 2 to begin swinging upwardly about the pivot member 58c, resulting in the vacuum cup 29 carrying corner S2 of the sheet of material up and about the bouquet to be wrapped.

It will be appreciated that the inner surface of the corner S2 of the sheet of material may have an adhesive or coadhesive which will adhere to the outer surface of the corner S1 of the sheet of material in the overlapping area of

the final configuration. Accordingly, it is not advisable to drag the material across previously wrapped material, since premature attachment of the overlapping portions of the material would occur. Positioning the main and secondary swing arms 30, 31, 32 so as to have the fullest extent possible keeps the corner S2, and the adjacent portion of the sheet material, well away from the previously wrapped portion.

As the left hand wrap unit assembly 2 rises and brings corner S2 over the previously wrapped portion of the bouquet, at a prescribed position cylinder 59, mounted to the main swing arm 30 by screws 59b, begins to push rack 59a outwardly. As it does, pinion gear 59b, fixed or keyed to the left end of secondary swing arm stub portion 31, begins to rotate about shaft 59c. This reduces the diameter of the swing arm movement and begins to bring the corner S2 of the sheet of material closer to the partially wrapped bouquet, such action providing the same benefits as that previously described in connection with the radius-reducing action of the right hand wrap unit assembly 1. In the instant case, however, an additional feature is provided in the form of conical roller 34 which is shaped and positioned to meet with and roll against the conforming conical surface of wrap ring support member 50 near the completion of the wrap cycle.

Just before the completion of the wrap cycle, cylinder 60 extends to move the free end of cushion arm 32 closer to support member 50 so that roller 34 can positively and firmly roll against support member 50. Also, the last movement of the free end of cushion arm 32 brings the sheet of material into intimate contact with the previously partially wrapped bouquet so that the two portions of the overlapping sheet of material can be adhered to one another without dragging the material across itself at the end of the wrapping procedure.

FIGS. 4 and 5 will now be described, these figures showing the wrap ring assembly 5 in more detail. FIG. 4 is a view taken along the lines 4—4 in FIG. 1 except that some components have been removed from what actually would be viewed from that location so as not to obstruct the operation of the wrapping cylinder actuator 70 which is best seen in FIG. 4.

As previously indicated, at the beginning of the first portion of the wrap cycle, the wrap ring support member 50 opens up to allow a bouquet to be inserted with the bloom end oriented toward the wrap ring support member 50. Wrap ring support member 50 comprises two halves 50a and 50b, the bottoms of which are connected to a wrap ring linkage 51 by hinges 73. Also mounted on wrap ring linkage 51 is the cylinder portion of a wrap ring cylinder 66 having a cylinder piston shaft 69 reciprocating within wrap ring cylinder 66. Mounted to the end of piston shaft 69 is an elongated pivot rod 74 which provides a pivot axis for the two links 71 which have their upper ends pivoted to a common pivot axis at pivot rod 74 and their lower ends separately pivotable about pivot pins 75 at the upper ends of a pair of standoffs 72 welded or otherwise fixed to the respective wrap ring support member halves 50a and 50b.

As can be seen in FIG. 4, the solid lines show the wrap ring support member 50 in a closed position due to the fact that the wrap ring cylinder piston shaft 69 is fully extended from wrap ring cylinder 66. When cylinder piston shaft 69 is retracted into wrap ring cylinder 66, pivot rod 74 is moved downwardly, and ultimately standoffs 72 assume a substantially vertical position as shown in dashed lines in FIG. 4. In this condition, the wrap ring support member 50 is in its

fully open position. Also shown in dashed lines in FIG. 4 is the position of the two wrap ring support member halves **50a** and **50b** in the fully open position.

Below machine top **53** is a ring pin receiver **49** upon which is mounted a number of electrical microswitches **76a-76d**. Each microswitch is operated by the pushing of an associated switch button **77a-77d** on each microswitch.

A wrap ring pin **52** is fixed to the wrap ring linkage **51** and has a length which is predetermined by the size of the wrap ring support member **50**. That is, the invention is able to accommodate a variety of sizes of bouquets to be wrapped, and for each size wrap, in order to obtain the optimum wrapping for a pleasing appearance and security, the wrap ring support member **50** must be a different size as well. By way or example, and without limitation, the wrap ring support member **50** may accommodate bouquets having a bloom diameter of 4", 5", 6" and 8". For a 4" bouquet, the wrap ring pin **52** would be of a length sufficient to only operate button **77a** on microswitch **76a**. This sets the electrical circuit which operates the left hand and right hand wrap unit assemblies **1** and **2** so as to establish the required path and timing and to manipulate the sheet of material **S** in an optimum manner to produce a secure and pleasing wrapped bouquet product. The effects of operating one or more of microswitches **76a-76d** will be explained later.

When wrap ring assembly **5** is removed and another sized wrap ring assembly is to be substituted, lock-down screw **51a** is loosened, wrap ring linkage **51** is grasped, and the assembly **5** is raised withdrawing pin **52** from sleeve **49a**. The replacement assembly **5** is then installed by inserting its pin **52** into sleeve **49a** and tightening screw **51a**. In the embodiment illustrated, if the replacement assembly **5** is for wrapping a 5" bouquet, the pin **52** would be of a length to operate microswitches **76a** and **76b**. For a 6" bouquet, microswitches **76a-76c** are operated, and for an 8" bouquet, all microswitches **76a-76d** are operated. An appropriate circuit (not shown) is responsive to the four different electrical responses to set up the required path and timing which are optimum for the different sized bouquets to be wrapped.

As can be appreciated by reference to FIG. 5, the wrap ring support member **50** is supported suspended above the machine top **53** to permit a sheet of material **S** to slide between wrap ring linkage **51** and the top surface of machine top **53**. Wrap ring linkage **51** is rigidly held in the suspended position by means of a manual lock-down screw **51a** which is screwed into machine top **53** until wrap ring linkage **51** is clamped securely against a spacer washer **51b** which surrounds pin **52**. Wrap ring pin **52** is further secured into cooperative relationship with switch buttons **77a-77d** by means of sleeve **49a** which has an inside diameter just slightly larger than the outside diameter of pin **52**. Sleeve **49a** is also secured to the machine top **53**.

FIG. 5 also best shows the operation of the sheet clamp **4** which comprises a fixed clamp cylinder **61** screwed into a fixed clamp cylinder mount **47** attached to the bottom of machine top **53**. An opening **53a** is provided in the machine top **53** so as to permit piston plunger **48** of the fixed clamp **4** to reciprocate within cylinder **61**. Upon extension of the piston plunger **48** upwardly (in FIG. 5), the sheet of material will be clamped against the bottom of wrap ring linkage **51** to hold the sheet of material in place during the entire wrapping operation. Cylinder **61** is de-energized at the conclusion of the wrap cycle so that the completely wrapped bouquet can be easily removed from the assembly.

FIGS. 6-8 show the operation of the stem wrapper unit assembly **3**. FIG. 6 is the view from the top of the apparatus,

FIG. 7 is a side elevation view, and FIG. 8 is an end view as would be seen by the stem portion of the bouquet to be wrapped. Basically, the stem wrapper unit assembly **3** comprises a motor **68** (turning at 154 RPM) driving a gear assembly **46, 37** which rotates a half cylinder shaped stem wrapper **36**, and a moving pinch clamp assembly **40** which extends within the center of wrapper **36**.

Before the beginning of the wrap cycle, moving pinch clamp assembly **40** is retracted to the left as shown in dashed lines in FIG. 7 by the action of wrapper clamp slide cylinder **64** pushing its piston **64a** out of the cylinder **64**. Also, wrapper clamp cylinder **63** has its piston **63a** retracted as shown in solid lines in FIG. 7, which pulls to the left the tab of a wrapper clamp actuator **43**, thereby opening the jaws of pinch clamp **40**. The operation of cylinder **63** and moving pinch clamp assembly **40** is very similar to that described in connection with FIG. 1 where the operation of cylinder **62** was detailed. Accordingly, no additional operating functions are necessary to be explained at this juncture except to indicate that the cylinder **63** is mounted to a wrapper clamp cylinder mount **41** which, itself, reciprocates axially of wrapper **36** by the action of wrapper clamp slide cylinder **64**. Accordingly, cylinder **64** operates to move the entire pinch clamp assembly **40** toward and away from the edge of the sheet **S**, while cylinder **63** operates to close and open the jaws of pinch clamp **40**.

Thus, before the wrap cycle begins, cylinder **64** has its piston shaft **64a** extended to move the wrapper clamp cylinder mount **41** to the left (in FIG. 7), and cylinder **63** has its piston shaft **63a** withdrawn so as to pull wrapper clamp actuator **43** to the left, opening the jaws of pinch clamp **40**. After a sheet of material **S** is placed on machine top **53** and the corner **S3** is slipped over the edges of wrapper **36**, cylinder **64** is actuated to move the wrapper clamp arm **42** and wrapper clamp cylinder mount **41** to the right, resulting in the pinch clamp **40** positioned with its opened jaws receiving corner **S3** of the sheet of material. Subsequently, cylinder **63** is actuated to extend its piston shaft **63a** to cause wrapper clamp actuator **43** to close the jaws of pinch clamp **40** and clamp the corner **S3** of the sheet of material in place.

FIG. 8 shows an optional stem wrapper safety cover **45** which is hinged at **45a** by any manner of hinging to machine top **53**. In this way, the operation of the stem wrapping unit **3** can be completed without exposure of the rotating cylinder wrapper **36** which could be a threat to the safety of the operator.

After the sheet of material **S** is deposited on the surface of machine top **53**, the jaws of pinch clamp **40** clamp the corner **S3** into position, the wrap ring support member **50** opens and the bouquet of flowers to be wrapped is placed on the top of sheet **S** with the stems contained within the U-shaped stem holder **44**. The cover **45** is then closed, and the operator initiates the wrapping cycle. At the appropriate point in the wrapping cycle, gear assembly **46** rotates wrapper gear **37** to, in turn, rotate the cylindrical-shaped wrapper **36** in the direction of the arrow shown in FIG. 8.

In FIG. 8, the position of wrapper **36** is shown in the orientation just prior to the wrapping operation. After the first and second halves of the wrapping cycle are completed by the left hand and right hand wrap unit assemblies **1** and **2**, or just prior to such completion, cylinder **36** begins to rotate counterclockwise as seen in FIG. 8.

A relatively strong leaf spring **78** is mounted at one of its ends by leaf spring mount **79** to the inside surface of wrapper **36**. Leaf spring **78** is pretensioned to apply a force upwardly at its left free end as shown in FIG. 8. Leaf spring **78**,

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however, is prevented from having its left end move upwardly by the provision of a stop **80** also mounted to the inside surface of wrapper **36** diametrically opposite spring mount **79**. This construction permits the leaf spring **78** to be pushed in a counterclockwise direction when the force against it, during the wrapping operation, exceeds its spring force tending to push it against stop **80**.

When the stems of the bouquet to be wrapped are placed in U-shaped stem holder **44**, the stems at the bottom of the bouquet rest against the top surface of leaf spring **78**, since the bottom of the U-shaped stem holder **44** is located beneath leaf spring **78**. At the appropriate time, near or after the sheet of material **S** is wrapped around the bouquet, motor **68** begins to rotate to, in turn, rotate stem wrapper **36** in a counterclockwise direction. With the stems of the bouquet captured between the walls of U-shaped stem holder **44**, leaf spring **78** applies a strong spring force against the sheet of material to press it tightly against the stem portion of the bouquet. Since the bouquet itself is being held stationary, and since the sheet of material has been fully wrapped around the bouquet, stem wrapper **36** adds security to the wrapped bouquet by pressing the wrapping tightly against the stem portion of the bouquet. If the portion of the sheet of material has an adhesive coating on it at the location of wrapper **36**, the leaf spring **78** will create overlapping folds which maintain their pressed condition due to the adhesive and to the applied pressure by leaf spring **78** as wrapper **36** rotates about the stem portion of the bouquet.

In a preferred embodiment of the invention, the stem wrapper **36** rotates two times about the stem portion of the bouquet and comes to a stop in the same position as its starting position to allow the bouquet to be easily removed from the apparatus by raising the stem wrapper cover **45** and simply removing the bouquet by an upward movement, stems first. Of course, by this time, i.e. after completion of the number of turns that wrapper **36** makes, cylinder **63** retracts its piston shaft **63a**, and cylinder **64** extends its piston shaft **64a** to release the sheet of material from moving clamp jaws **40**. Before or after removal of the bouquet from the apparatus, the wrap may be maintained about the bouquet or floral grouping using an elastic or nonelastic band, a decorative tie, adhesives and cohesives, ribbons, ribbons with adhesive, bows, stickers which can be decorative and/or informative or simply plain, tapes, heat sealing, sonic sealing and welding, wire ties, tie wraps, curl film, dead-fold plastic ties, dead-fold wrapping material in part or in whole, or other banding and/or bonding material.

Prior to removal of the completely wrapped bouquet, the left and right hand wrap unit assemblies **1** and **2** will still be in the vicinity of the wrap ring support member **50** with corners **S1** and **S2** still being held by jaws **11** and suction cup **29**.

Suction cup **29** can be easily released by simply relieving the negative pressure applied to suction cup **29** and retracting the left hand wrap unit assembly in the reverse order of operating cylinders **58**, **59**, and **60** described. However, the jaws **11** of the right hand wrap unit assembly, even though released, may still interfere with the sheet of material if the sheet material is much larger than the bouquet being wrapped leaving a large skirt portion extending beyond the wrap ring support member **50**. To prevent interference of the right hand wrap unit assembly with the sheet of material of the wrapped bouquet at the completion of the wrapping cycle, a slide subassembly **23** is provided. This assembly is screw mounted to the bottom side of the machine top **53** and is shown in phantom lines in FIG. **1** as it would be viewed from the top of the apparatus, is shown from the side in FIG. **9A**, and is shown from the bottom as in FIG. **9B**.

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The slide subassembly **23** basically comprises a slide member **27**, similar to that of a furniture drawer slide, and an actuator. The slide member **27** itself is comprised of a U-shaped outer channel member **27a** and a U-shaped inner channel member **27b** which slides within the outer channel **27a** in a manner known in the furniture art. Appropriate bearings (not shown) may be provided to assist in reducing the friction in the extension and retraction directions of the slide movement.

In the instant case, the outer slide member **27a** is fixed and mounted to the underside of machine top **53** by slide mount spacers **26**, slide mounts (forward and rear) **28**, and bolts and nut combinations **28a**.

At the free end of the moveable slide member **27b**, a slide cylinder rod mount **24** is rigidly mounted by means of a bolt **24a** passing through a hole in right hand unit angle mount **21** and through a movable slide member spacer **25**. For security, a second bolt **24b** is shown to secure right hand unit angle mount **21** to the distal end of moveable slide member **27b**.

The entire slide assembly **27** is mounted at an angle to the longitudinal direction of right hand unit angle mount **21**, the angle being chosen to move the clamp **11** away from the wrapped bouquet and along a line which would pass through the location of pinch clamp **11** and would lie against the surface of the wrapped conical-shaped bouquet. Since clamp **11** comes to rest at the end of the wrapped cycle on the far side of wrap ring support member **50**, the direction of movement of the entire right hand wrap unit assembly by the action of slide **27** is substantially in line with the material lying on the far side of the bouquet.

Also mounted to the bottom of machine top **53**, and taking advantage of the mounting screws already provided for fixing the fixed slide member **27a** to the bottom of machine top **53**, is a slide cylinder **65**. Cylinder **65** actuates a piston **65a** which has its operating end attached to slide cylinder rod mount **24**. It can be appreciated that all of the elements of the right hand wrap unit assembly **1** are mounted on right hand unit angle mount **21** which is rigidly mounted to the end of moveable slide member **27b**. Therefore, as piston **65a** moves out of and into cylinder **65**, the entire right hand wrap unit assembly **1** moves away and toward the machine top **53**. As with all of the other elements which move during the wrapping process, the timing of the slide movement is electronically controlled to be effective at the appropriate time in the wrap cycle.

The timing of the complete wrap cycle will now be described. It should be appreciated that, prior to the start of the operation, the appropriate sized wrap ring support member **50** will have been chosen so as to select the appropriate number of microswitches **76a-76d** that will be activated by pin **52** which thereby sets the proper electrical parameters and timing for the ensuing operations.

First, a preselected sized sheet of plastic film, clear or colored, painted or unpainted, printed or unprinted, adhesive coated or not, is selected from a stack of pre-cut sheets or automated with a dispenser which feeds a sheet from a roll to the proper working position on the machine top **53**. With the sheet in place, an operator pushes a start button (not shown). The sheet of material **S** is then clamped at all four corners **S1-S4** by extending and closing pinch clamp **11** at corner **S1**, by applying negative pressure to the suction cup **29** at corner **S2**, by movement of pinch clamp assembly **40** toward the sheet of material and then clamping the material at corner **S3**, and by actuating cylinder **61** to cause plunger **48** to press corner **S4** against the bottom of wrap ring linkage **51**. At substantially the same time, cylinder **66** retracts to

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open wrap ring support member 50 so as to be able to receive a bouquet of flowers. Thus, with the appropriate sized wrap ring support member 50 in place, the stem wrapper cover 45 is opened and a bouquet is placed with the flowers in the wrap ring 50 and the stems in the stem holder 44 in stem wrapper unit assembly 3.

The operator then closes cover 45 over the stems and pushes another button (not shown) to start the wrapping cycle.

The wrap ring assembly 5 closes by the extension of cylinder 66 and the right hand wrap unit assembly 1 carries the right hand side of the film sheet to wrap around the bouquet and wrap ring support member 50 from right to left. Then, the left hand wrap unit assembly 2 carries the left side of the film sheet to wrap from left to right, and finally the stem wrap unit 3 tightens the wrapping of the stems of the bouquet. At the conclusion of the wrap cycle, the corner clamps are released in the manner previously described, slide subassembly 23 slides right hand wrap unit assembly 1 away from the wrapped bouquet, the right and left hand wrap unit assemblies 1, 2 retract to their initial position, and the operator lifts cover 45 and removes the wrapped bouquet, stems first, by pulling the wrapped stem portion away from wrap ring support member 50, thereby pulling the bloom end of the wrapped bouquet through the closed wrap ring support member 50 with the sheet of material S sliding by the outer periphery of support member 50, completing the cycle.

Preferably, after clamping the sheet of material, the corners S1 and S2 are held in slight tension by cylinders 56 and 60 to approximately one half to one pound tension.

The wrap ring support member 50 is specifically designed to have a truncated conical shape and an average diameter of approximately 4", 5", 6", and 8". This allows wrapping the cone of the film material tightly without damaging or crushing the bouquet and automatically sets up the required path of the right hand and left hand wrap unit assemblies 1, 2. That is, for a larger diameter bouquet to be wrapped, the extent of the movement of the racks which swing the left and right hand wrap unit assemblies 1, 2 about the bouquet, is greater than it would be for a smaller diameter bouquet. These movement and timing functions, which result in corresponding mechanical movement functions, can be controlled by a central processor or any type of electromechanical timing element. Such electronic and electromechanical timing devices are well known in various arts, including washing machines, VCRs, and the like, and no discussion of the operation of such devices is deemed necessary or warranted in this description.

The specific arrangement described herein is merely one example of a preferred embodiment of the invention. It will be apparent to those skilled in the art that changes may be made in the construction and in the operation of the various components, elements and assemblies described herein, or in the steps or the sequence of steps of the methods described herein, without departing from the spirit and scope of the invention. For example, with a mathematical analysis of the desired path for a particular size bouquet, a cam or gear system could be designed to force the sheet clamps 11 and 29 to follow a prescribed path without having to operate a series of actuators during movement of the right and left hand wrap unit assemblies 1 and 2. Further, an automatic bonding unit can be employed to bond the overlapped area of the sheet. For example roller 34 could be heated or vibrated to effect bonding between itself and the rigid wrap ring support member 50. Optionally, an automatic bonding

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unit could be employed to place an elastic or nonelastic band about the wrapped bouquet. Accordingly, the invention is to be interpreted only as to the scope of the appended claims.

What is claimed is:

1. A method for automatically wrapping a sheet of material about an item having a bloom end comprising one or more blooms and a stem end comprising one or more stems, the stem end distal to the bloom end, said method comprising the steps of:

providing an automatic wrapping apparatus, the apparatus comprising:

support means for supporting a sheet of material,  
placing means for automatically placing a portion of the sheet of material about the bloom end of the item,  
and

stem wrapping means for automatically wrapping another portion of the sheet of material about at least a portion of the stem end of the item;

disposing a sheet of material upon the support means;

positioning the item upon the sheet of material;

actuating the placing means to cause a portion of the sheet of material to be placed about at least a portion of the bloom end of the item; and

actuating the stem wrapping means causing portions of the sheet of material placed about the stem end to be wrapped more tightly than portions of the sheet placed about the bloom end.

2. The method as claimed in claim 1 wherein in the step of disposing a sheet of material, the sheet of material has a bonding material disposed upon a portion thereof for bonding portions of the sheet together.

3. The method as claimed in claim 1 comprising the additional steps of providing a continuous roll or sheet material, automatically dispensing and feeding the sheet material from the roll onto the support member, and severing the sheet of material to produce a single sheet of material for disposing upon the support means in said disposing step.

4. An apparatus for automatically wrapping a sheet of material about an item having a bloom end comprising one or more blooms and a stem end comprising one or more stems, the stem end distal to the bloom end, comprising:

support means for supporting the sheet of material;

placing means for automatically placing a portion of the sheet of material about at least a portion of the bloom end of the item, the placing means distinct from the sheet of material; and

stem wrapping means for automatically wrapping the stem end of the item in such a way that the stem end is wrapped more tightly than the bloom end of the item.

5. The apparatus of claim 4 wherein the placing means further comprises first moving means for automatically moving a first portion of the sheet of material over the item and second moving means for automatically moving a second portion of the sheet of material in a position extending over a part of the first portion of the sheet of material after the first portion has been moved over the item.

6. The apparatus of claim 4 wherein the stem wrapping means further comprises gripping means for gripping a portion of the sheet of material near the stem end of the item and engaging means for causing a portion of the sheet adjacent the stem end to engage an adjacent portion of the sheet for holding the sheet about a portion of the stem end.

7. The apparatus of claim 4 further comprising a ring member having a hollow area and an outer surface, the hollow area for holding a portion of the bloom end of the item and the outer surface for providing a form for the sheet of material as the sheet is wrapped about the item.

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8. The apparatus of claim 7 wherein the ring member has a truncated conical shape and has a larger diameter and a smaller diameter with the smaller diameter nearer the stem wrapping means.

9. The method of claim 2 wherein in the step of actuating the placing means, portions of the sheet of material placed about the bloom end are overlapped and bondingly connected together by the bonding material.

10. The method of claim 2 wherein in the step of actuating the stem wrapping means, portions of the sheet of material disposed about the stem end are overlapped and bondingly connected together by the bonding material.

11. The method of claim 1 wherein in the step of providing an automatic wrapping apparatus, the placing means further comprises first moving means for automatically moving a first portion of the sheet of material over the item and second moving means for automatically moving a second portion of the sheet of material to a position extending over a part of the first portion of the sheet of material after the first portion has been moved over the item.

12. The method of claim 11 wherein in the step of actuating the placing means, the first moving means is actuated to move the first portion of the sheet over the item followed by actuating the second moving means to move the second portion of the sheet to the position extending over a part of the first portion.

13. The method of claim 12 comprising the additional step of bonding portions of the first portion of the sheet to portions of the second portion of the sheet.

14. A method for automatically wrapping a sheet of material about an item having a bloom end comprising one or more blooms and a stem end comprising one or more stems, the stem end distal to the bloom end, comprising:

providing a sheet of material;

placing the sheet of material on a support surface;

providing the item and positioning the item on the sheet of material;

providing automatic covering means, the automatic covering means distinct from the sheet of material; and

actuating the automatic covering means to cause the sheet of material to be wrapped about a portion of the stem end and about a portion of the bloom end and wherein the sheet of material is wrapped more tightly about the stem end than about the bloom end.

15. A method for automatically wrapping a sheet of material about an item having a bloom end comprising one

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or more blooms and a stem end comprising one or more stems, the stem end distal to the bloom end, comprising:

providing a sheet of material, the sheet of material having a bonding material thereon for bondingly sealing the sheet of material about the item;

providing automatic covering and sealing means;

placing the sheet of material on a support surface;

providing the item and positioning the item on the sheet of material;

actuating the automatic covering and sealing means causing the sheet of material to cover a portion of the bloom end and a portion of the stem end of the item and sealing portions of the sheet together about the item; and

wherein the automatic covering means causes the sheet of material to be wrapped about a portion of the stem end and about a portion of the bloom end and wherein the sheet of material is wrapped more tightly about the stem end than about the bloom end.

16. A method for automatically wrapping a sheet of material about an item having a right side and left side, the item having a bloom end comprising one or more blooms and having a stem end comprising one or more stems, the stem end distal to the bloom end, the method comprising the steps of:

providing a sheet of material having a first portion and a second portion, and placing the sheet against a support surface;

positioning the item on the sheet with the first and second portions of the sheet extending on the right and left sides, respectively, of the item;

automatically moving the first portion of the sheet in a first path to at least partially encompass the bloom end of the item;

automatically moving the second portion of the sheet in a second path to at least partially encompass the bloom end of the item and to extend over a part of the first portion of the sheet; and

causing a portion of the stem end of the item to be wrapped by a portion of the sheet wherein the stem end is wrapped more tightly than the bloom end.

\* \* \* \* \*

UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 5,564,257  
DATED : October 15, 1996  
INVENTOR(S) : Fantz et al.

Page 1 of 2

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,

Item [56], under "References Cited", after "U.S. PATENT DOCUMENTS" please insert the following references

-- 1,525,015	2/1925	Weeks
1,942,017	1/1934	Baldwin
1,961,640	6/1934	Miller
2,079,116	5/1937	Gardner
2,331,543	10/1943	Emery
2,685,771	8/1954	Magnuson et al.
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4,003,189	1/1977	Little et al.
4,554,777	11/1985	Denk et al.
4,570,415	2/1986	Centeno
4,989,396	2/1991	Weder et al.
5,020,301	6/1991	Helms --.

Item [56], under "References Cited", after "FOREIGN PATENT DOCUMENTS" please insert the following reference

-- 1166692      3/1964      Germany --

Column 5,

Line 20, please delete "unit assembly i" and substitute therefor -- unit assembly 1 --.

Column 6,

Lines 60-61 and 67, please delete "piston 57b" and substitute therefor -- piston shaft 57b --.

Column 7,

Line 16, please delete "piston 56a and substitute therefor -- piston shaft 56a --.

Line 55, please delete "mounting bracket 53b" and substitute therefor -- elongated slat 53b --.

Lines 60 and 61, please delete "pivot member 58c" and substitute therefor -- shaft 58c -  
--.



UNITED STATES PATENT AND TRADEMARK OFFICE  
**CERTIFICATE OF CORRECTION**

PATENT NO. : 5,564,257  
DATED : October 15, 1996  
INVENTOR(S) : Fantz et al.

Page 2 of 2

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 9,

Line 15, please delete "way or example" and substitute therefor -- way of example --.

Line 41, please delete "is supported suspended" and substitute therefor -- is suspended --.

Column 12,

Line 61, please delete "pitch clamp 11" and substitute therefor -- pinch clamp 11 --.

Signed and Sealed this

Thirtieth Day of October, 2001

*Attest:*

*Nicholas P. Godici*

*Attesting Officer*

NICHOLAS P. GODICI  
*Acting Director of the United States Patent and Trademark Office*